

CLAIMS:

1. A method for comparing first and second signal arrays, the arrays being comprised of pixels, each pixel in an array having an intensity, the method comprising steps of:
 - 5 (a) associating to each of a plurality of pixels x_i in the first array a pixel $T(x_i)$ in the second array, and
 - (b) applying a linear regression analysis to the ordered pairs of numbers $(x_i, T(x_i))$ so as to produce a slope.
2. The method according to Claim 1 wherein the first and second signal arrays
10 are superimposed and $T(x_i) = x_i$.
3. The method according to Claim 2 wherein the first and second signal arrays are obtained by incubating a DNA chip in the presence of first and second probe species, the first probe species producing a signal that is distinguishable from a signal produced by the second probe species.
- 15 4. The method according to Claim 2 wherein the first and second signal arrays are obtained by staining a spot in separation pattern with first and second labels, the first label producing a signal that is distinguishable from a signal produced by the second label.
5. The method according to Claim 1 wherein the first and second arrays are not
20 superimposed.
6. The method according to Claim 5 wherein the first and second signal arrays are spots in a first and second separation pattern, respectively.
7. The method according to Claim 6 wherein the first and second separation patterns are in register, and for each pixel x_i in the first spot, $T(x_i)$ is the spot in the
25 second separation pattern in register with x_i .
8. The method according to any one of the previous claims for use in determining differential gene expression or differential protein expression.
9. A method for determining differential gene expression of a gene comprising steps of:

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- (a) obtaining digitized images of first and second signal arrays representing first and second expression levels of the gene, respectively, each pixel in an image having an intensity;
 - (b) associating to each of a plurality of pixels x_i in the first image a pixel $T(x_i)$ in the second image, and
 - (c) applying a linear regression analysis to the ordered pairs of numbers $(x_i, T(x_i))$ so as to produce a slope.
10. The method according to Claim 9 wherein the first and second signal arrays are superimposed and $T(x_i) = x_i$.
11. The method according to Claim 10 wherein the first and second signal arrays are obtained by incubating a DNA chip in the presence of first and second probe species, the first probe species producing a signal that is distinguishable from a signal produced by the second probe species.
12. The method according to Claim 10 wherein the first and second signal arrays are obtained by staining a spot in separation pattern with first and second labels, the first label producing a signal that is distinguishable from a signal produced by the second label.
13. A method for determining differential protein expression comprising steps of:
- (a) obtaining digitized images of first and second signal arrays representing first and second expression levels of the protein, respectively, each pixel in an image having an intensity;
 - (b) associating to each of a plurality of pixels x_i in the first image a pixel $T(x_i)$ in the second image, and
 - (c) applying a linear regression analysis to the ordered pairs of numbers $(x_i, T(x_i))$ so as to produce a slope.
14. The method according to Claim 13 wherein the first and second arrays are not superimposed.
15. The method according to Claim 14 wherein the first and second signal arrays are spots in a first and second separation pattern, respectively.

16. The method according to Claim 15 wherein the first and second separation patterns are in register, and for each pixel x_i in the first spot, $T(x_i)$ is the spot in the second separation pattern in register with x_i .

17. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for comparing digitized images of first and second signal arrays, the images being comprised of pixels, each pixel in an image having an intensity, the method comprising steps of:

- (a) associating to each of a plurality of pixels x_i in the first image a pixel $T(x_i)$ in the second image, and
- (b) applying a linear regression analysis to the ordered pairs of numbers $(x_i, T(x_i))$ so as to produce a slope.

18. A computer program product comprising a computer useable medium having computer readable program code embodied therein for comparing digitized images of first and second signal arrays, the images being comprised of pixels, each pixel in an image having an intensity, the computer program product comprising:

- computer readable program code for causing the computer to associate to each of a plurality of pixels x_i in the first image a pixel $T(x_i)$ in the second image, and
- computer readable program code for causing the computer to apply a linear regression analysis to the ordered pairs of numbers $(x_i, T(x_i))$ so as to produce a slope.

19. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for determining differential gene expression of a gene comprising steps of:

- (a) obtaining digitized images of first and second signal arrays representing first and second expression levels of the gene, respectively, each pixel in an image having an intensity;
- (b) associating to each of a plurality of pixels x_i in the first image a pixel $T(x_i)$ in the second image, and

- (c) applying a linear regression analysis to the ordered pairs of numbers (x_i , $T(x_i)$) so as to produce a slope.

20. A computer program product comprising a computer useable medium having computer readable program code embodied therein for determining
5 differential gene expression of a gene the computer program product comprising:

computer readable program code for causing the computer to obtain digitized images of first and second signal arrays representing first and second expression levels of the gene, respectively, each pixel in an image having an intensity;

10 computer readable program code for causing the computer to associate to each of a plurality of pixels x_i in the first image a pixel $T(x_i)$ in the second image, and

computer readable program code for causing the computer to apply a linear regression analysis to the ordered pairs of numbers (x_i , $T(x_i)$) so as to produce a
15 slope.

21. A program storage device readable by machine, tangibly embodying a program of instructions executable by the machine to perform method steps for determining differential protein expression comprising steps of:

(a) obtaining digitized images of first and second signal arrays representing
20 first and second expression levels of the protein, respectively, each pixel in an image having an intensity;

(b) associating to each of a plurality of pixels x_i in the first image a pixel $T(x_i)$ in the second image, and

(c) applying a linear regression analysis to the ordered pairs of numbers (x_i , $T(x_i)$) so as to produce a slope.
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22. A computer program product comprising a computer useable medium having computer readable program code embodied therein for determining differential protein expression the computer program product comprising:

computer readable program code for causing the computer to obtain
30 digitized images of first and second signal arrays representing first and second

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expression levels of the protein, respectively, each pixel in an image having an intensity;

computer readable program code for causing the computer to associate to each of a plurality of pixels x_i in the first image a pixel $T(x_i)$ in the second image,
5 and

computer readable program code for causing the computer to apply a linear regression analysis to the ordered pairs of numbers $(x_i, T(x_i))$ so as to produce a slope.

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